

J. H. RAE.

Improvement in Voltaic Amalgamators for Gold and Silver.

No. 123,932.

Patented Feb. 20, 1872.

Fig. 1.

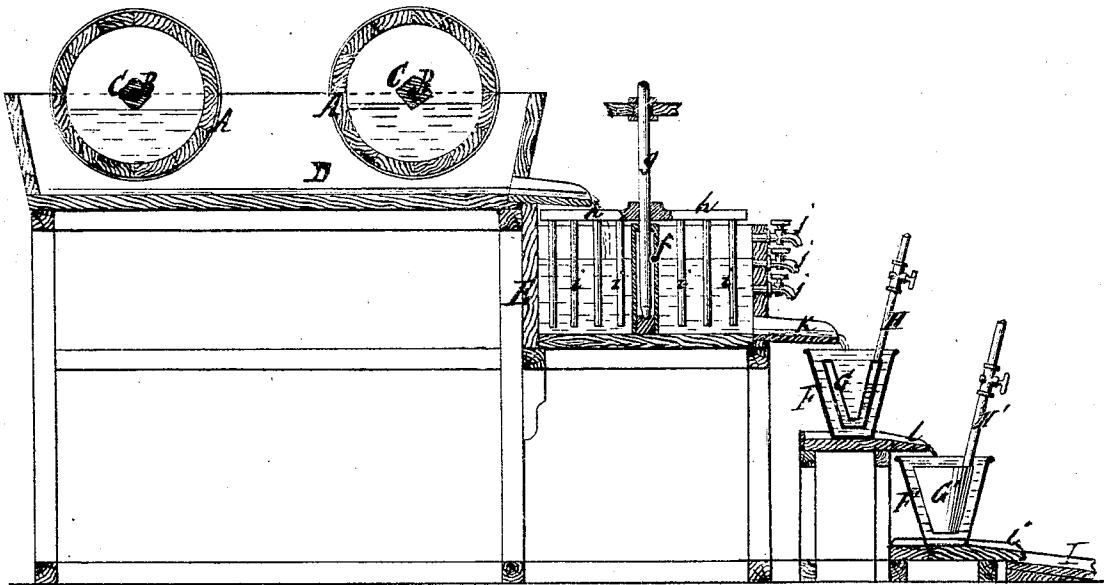
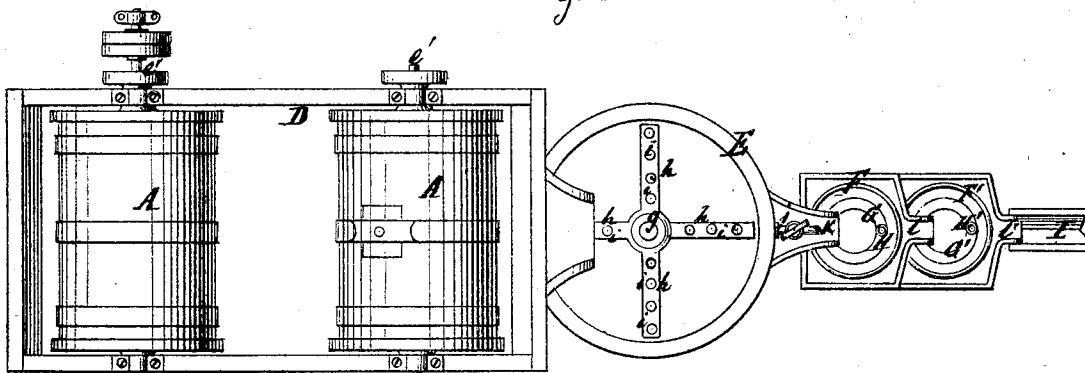


Fig. 2.



Witnesses.
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Fig. 3.

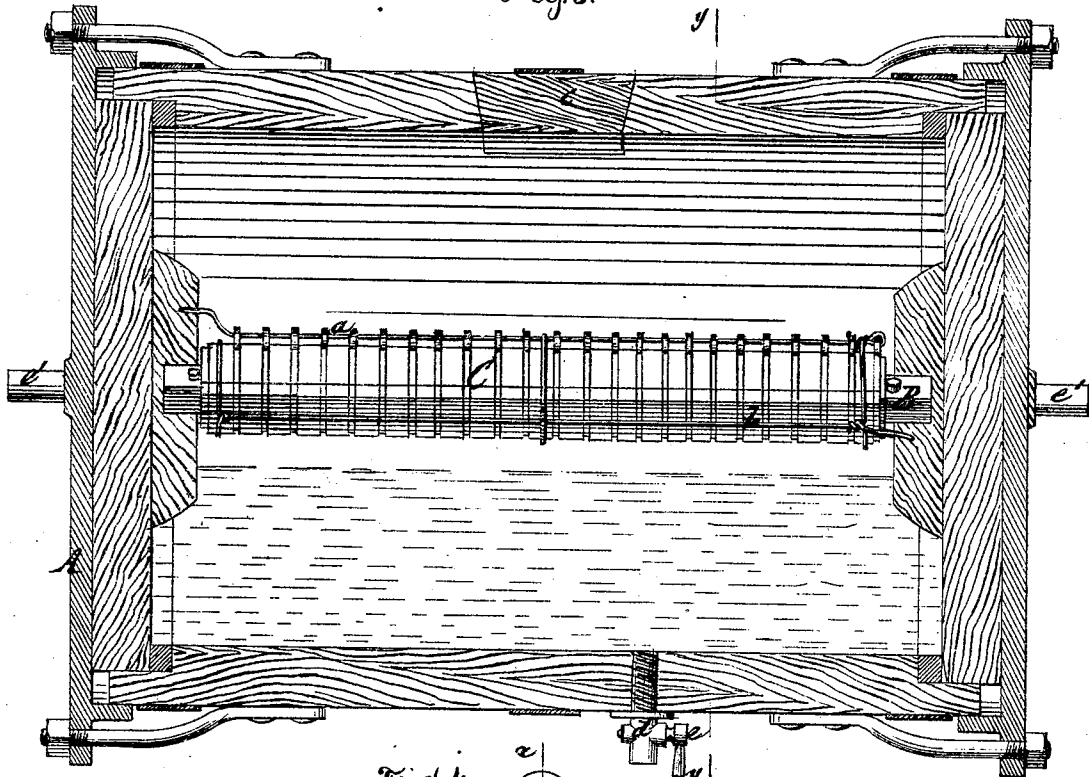
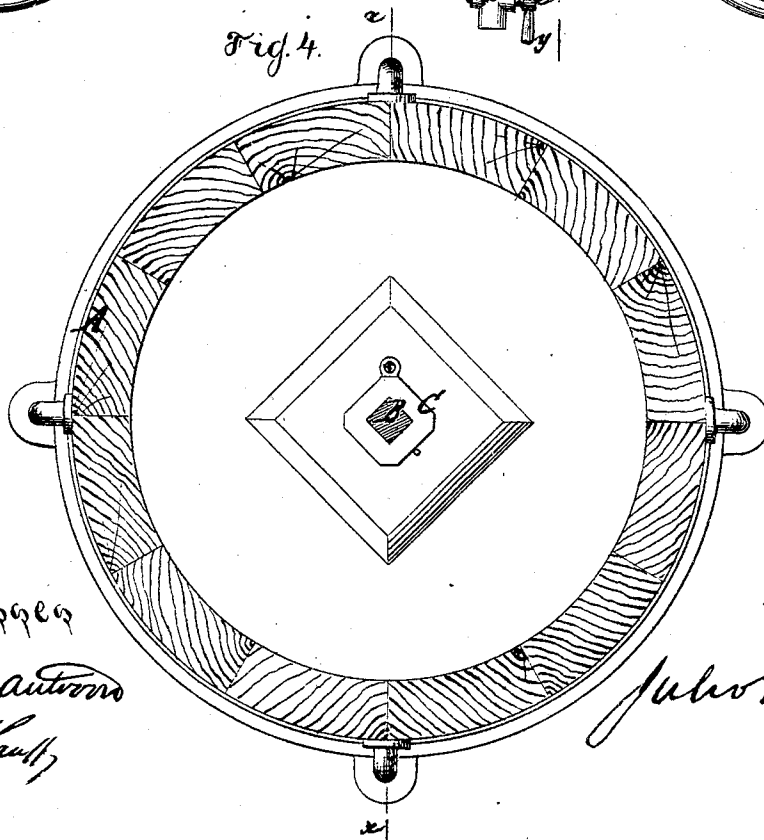


Fig. 4.



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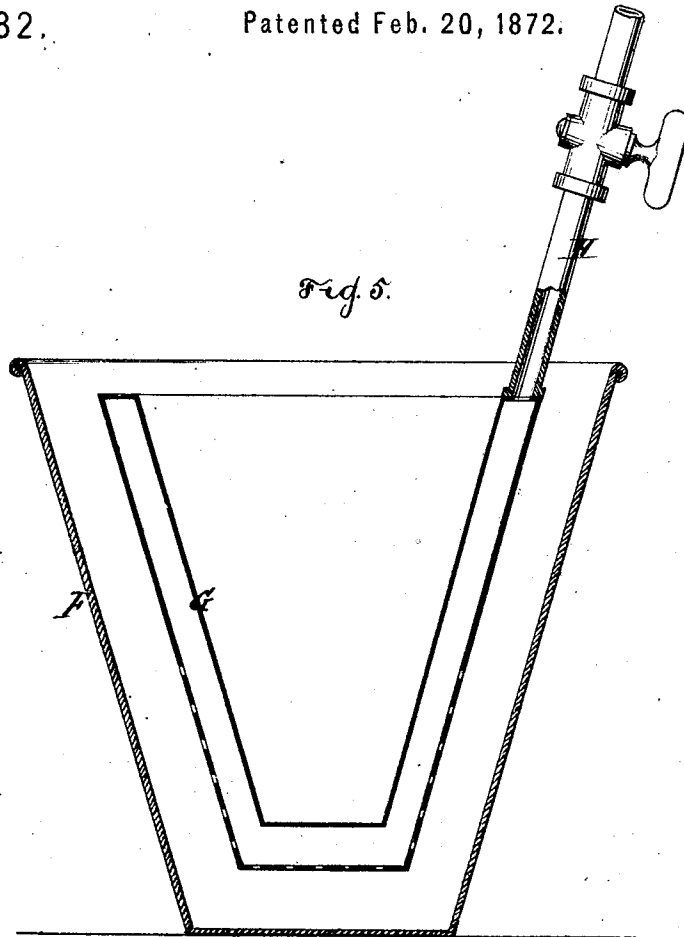
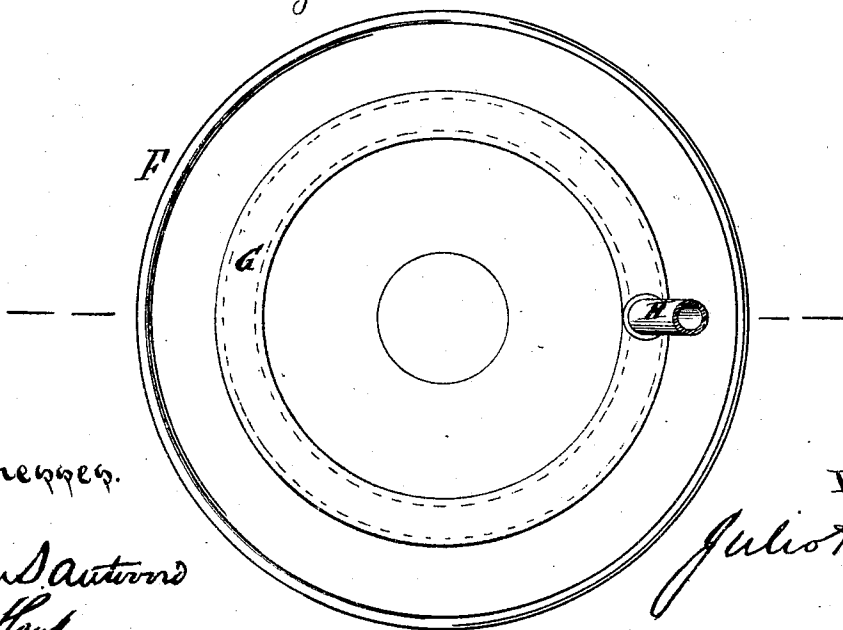


Fig. 6.



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IMPROVEMENT IN VOLTAIC AMALGAMATORS FOR GOLD AND SILVER.

Specification forming part of Letters Patent No. 123,932, dated February 20, 1872.

To all whom it may concern:

Be it known that I, JULIO H. RAE, of the city of Syracuse, in the county of Onondaga and State of New York, have invented a new and useful Improvement in Voltaic Amalgamators for Ore; and I do hereby declare the following to be a full, clear, and exact description thereof, which will enable those skilled in the art to make and use the same, reference being had to the accompanying drawing forming part of this specification, in which drawing—

Figure 1 represents a longitudinal vertical section of my invention. Fig. 2 is a plan or top view of the same. Fig. 3 is a detached longitudinal central section of the voltaic cylinder, which forms one of the principal parts of my amalgamator, in a larger scale than the previous figure, the line *x x*, Fig. 4, indicating the plane of section. Fig. 4 is a transverse section of the same in the plane *y y*, Fig. 3. Fig. 5 is a detached section of the washer in a larger scale than the first two figures. Fig. 6 is a plan or top view of the same.

Similar letters indicate corresponding parts.

This invention consists in the arrangement of a voltaic pile in the interior of an amalgamating-cylinder in such a manner that, when said cylinder is charged with the pulverized ore, quicksilver, and proper chemicals, and then revolved, the galvanic current excited in the pile materially promotes the amalgamating process. Also, in the arrangement of a rod extending centrally through the amalgamating-cylinder, and forming the support of the voltaic pile, the copper elements of which connect with one head, and the zinc elements of which connect with the opposite head of said cylinder, in such a manner that the elements are securely retained and not liable to get out of position by the revolution of the cylinder; and at the same time the voltaic pile offers the least possible obstruction to the revolving motion of the cylinder. Further, in the arrangement of one or more voltaic cylinders in a receiving-tank which connects with an agitating-tub in such a manner that the pulp discharged from said voltaic cylinder or cylinders can be washed, and the floating particles of quicksilver contained therein can be saved. Also, in combining the voltaic cylinders, the receiving-

tank, and the agitating-tub with one or more washers, composed of conical copper-lined vessels, each of which contains a hollow inverted truncated cone, suspended from a water-supply pipe, and provided with a large number of small holes in the bottom and lower part of its outer shell, in such a manner that, by the up current of the jets of water discharging from said holes, the particles of mercury still mixed with the tailings received in the washer are recovered, while the tailings flow off through a copper-lined gutter, the copper lining of which retains the last traces of mercury which may still be mixed with the tailings.

In the drawing, the letters *A A* designate cylinders, each of which is constructed as shown in Figs. 3 and 4 of the drawing. Through the center of each of these cylinders extends a rod, *B*, the ends of which have their bearings in sockets formed on the interior of the heads of the cylinder, and on this rod are secured the elements of a voltaic pile, *C*. All the copper elements of this pile are connected by a wire, *a*, which is in contact with one of the heads of the cylinder, while the zinc elements are connected by a wire, *d*, which is in contact with the opposite head of said cylinder. By this arrangement I obtain a voltaic pile of great power in a comparatively small space; but it must be remarked that one or more voltaic piles might be arranged in the interior of the cylinder in any desired position, and I do not wish to be confined to the precise arrangement of the voltaic pile which I have shown. Each of the cylinders *A* is provided in one side with a man-hole, through which the cylinder can be charged and discharged, and which can be firmly closed by a man-hole plate, *c*. Through the side of the cylinder opposite the man-hole extends a pipe, *d*, which can be opened and closed by a stop-cock, *e*, and which serves to draw off the quicksilver at the proper time, as will be hereafter more fully explained. From the outer surfaces of the heads of the cylinders project gudgeons, *e'*, which have their bearings in the edges of a tank, *D*, which is intended to receive the pulp and conduct it to the agitating-tub *E*. From the bottom of this tub rises a tube, *f*, to a level with the top edge, and this tube forms the bearing for a vertical shaft, *g*, from which extend radiating arms *h*,

carrying the agitators *i*, which extend down near to the bottom of the tub *E*, as shown in Fig. 1. In the side of this tub are three pipes, *j*, one above the other, and each provided with a stop-cock; and from the bottom of the tub, just beneath the pipes *j*, extends the discharge-spout *k*, which leads to the first washer *F*. An enlarged view of this washer is shown in Figs. 5 and 6 of the drawing. It consists of a conical tub, lined with copper, and in this tub is contained a double-walled inverted truncated cone, *G*, which is suspended from a water-supply pipe, *H*, and which is perforated with a number of small holes in its outer bottom and in the lower portion of its external jacket, so that the water admitted through the pipe *H* discharges from the cone *G* in a large number of fine jets, producing an upward current. The washer *F* is placed on a table, with a spout, *l*, extending over a second washer, *F'*, which is constructed like the first washer, and the discharge-spout *l'* of which extends over a gutter, *I*, lined with copper.

In using my invention I first reduce the ore to a fine powder, and then I introduce the same, together with a suitable quantity of water, quicksilver, and suitable exciting chemicals, into the cylinder or cylinders *A*. The chemicals which I use are common salt or such acids which, when brought in contact with the voltaic pile, will excite a galvanic current. In regard to the quantity of quicksilver and the character and quantity of the exciting agent used, reference must always be had to the nature of the ore and to the electric affinities of the metals contained in the ore about to be washed. After revolving the cylinder or cylinders from three to four hours, the quicksilver is drawn off through the pipe or pipes *d*. Then each cylinder is again revolved for a few minutes for the purpose of fluidizing the pulp, when the man-hole plate is taken out, and the whole contents of the cylinder discharged into the receiving-tank *D*, whence the pulp gradually discharges into the agitating-tub *E*. In this tub the pulp is agitated, the amalgam being precipitated, while the tailings are drawn

off through either of the pipes *j*, according to their specific gravity. The amalgam which collects on the bottom of the tub is removed from time to time, while the tailings pass into the first washer, *F*, where small particles of mercury, still mixed with the tailings, are precipitated or retained by the copper surface of the washer, while the light tailings are carried up by the up current of water produced by the jets of the cone *G*, and discharged over the edge of the washer *F* upon the table *l*, whence they run down into the second washer *F'*, to be treated in the same manner as above. From this second washer the tailings pass into the gutter *I*, the copper lining of which retains the last traces of mercury which may be still mixed with the tailings.

What I claim as new, and desire to secure by Letters Patent, is—

1. The arrangement of one or more voltaic piles in the interior of an amalgamating-cylinder, substantially as described.

2. The rod *B*, extending through the center of an amalgamating-cylinder, and supporting the elements of a voltaic pile, in combination with wires *a b*, one forming a connection between the copper and the other between the zinc elements of the pile, substantially as set forth.

3. The arrangement of one or more voltaic cylinders in a receiving-tank communicating with an agitating-tub, substantially in the manner shown and described.

4. The combination, with one or more voltaic cylinders, a receiving-tank, and an agitating tub, of one or more washers, *F F'*, substantially as set forth.

5. The double-walled hollow inverted cone *G*, communicating with a water-supply pipe, and provided with jets in its bottom and outer jacket, in combination with a washer, *F*, constructed substantially as described.

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Witnesses:

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